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ScienceDirect
Tanta Dental Journal 11 (2014) 161−168
www.elsevier.com/locate/tdj

The relationship between salivary levels of cortisol, chromogranin A (CgA) and xerostomia in post-menopausal women

E.A. Al-Kholy [a,*], M.A. Mahmoud [a], F.A. EL Nomany [a], E.A. EL Zamarany [b]

[a] *Oral Medicine, Periodontology, Oral Diagnosis & Oral Radiology, Faculty of Dentistry, Tanta University, Egypt*
[b] *Clinical Pathology, Faculty of Medicine, Tanta University, Egypt*

Received 3 March 2014; revised 15 June 2014; accepted 15 June 2014
Available online 27 September 2014

Abstract

Purpose: Menopause may be associated with some adverse changes, such as oral dryness (OD) feeling. The exact mechanisms that mediate sensation of OD in menopausal women have not been firmly established. The purpose of the present study was to assess the relationship of un-stimulated whole saliva cortisol and chromogranin A (CgA) levels with OD feeling in post-menopausal women.
Materials & methods: : The present study was conducted on eighty selected post-menopausal women with/without xerostomia. Subjects were equally divided into two groups, forty patients each. Group I: (study group) constituted by 40 female subjects meeting the selection criteria and having xerostomia. Group II: (control group) constituted by 40 female subjects meeting the same criteria with the exception of the presence of xerostomia. Un-stimulated whole saliva cortisol and chromogranin A concentrations were measured by ELISA (enzyme-linked immunosorbent assay). Collected data of the present study was tabulated and statistically analyzed using the statistical software package.
Results: The means of salivary cortisol and chromogranin A concentrations were significantly higher with significantly decrease in the mean un-stimulated salivary flow rate (UWSFR) in group I (xerostomia group) compared to group II (control group) ($P \leq 0.001$).
Conclusion: Significant associations between salivary cortisol and CgA levels and symptoms of oral dryness and reduced salivary flow rates were detected.

Keywords: Post-menopausal women; Salivary flow rate; Un-stimulated whole saliva; Xerostomia; Salivary cortisol; Salivary chromogranin A

1. Introduction

Menopause is defined as the permanent (after 12 months) cessation of menstruation resulting from the loss of ovarian function. The age at which physiological menopause appears is between 45 and 55 years, with an average of 52.5 years [1]. Utian, (1999) [2] classified menopause stages to: 1- *Pre-menopause:*

* Corresponding author. Oral medicine, Period ontology, Oral Diagnosis & Oral Radiology Dep., Faculty of Dentistry, Tanta University, Egypt. Tel.: +20 01001988415.
E-mail addresses: emysoliman33@yahoo.com (E.A. Al-Kholy), mohamed.ibrahim10@dent.tanta.edu.eg (M.A. Mahmoud), dr_fatma_elnomany@yahoo.com, fatma.elnommany@dent.tanta.edu.eg (F.A. EL Nomany).
Peer review under the responsibility of the Faculty of Dentistry, Tanta University

http://dx.doi.org/10.1016/j.tdj.2014.06.006
1687-8574/

the reproductive years prior to the last menstrual period, 2- *Peri-menopause:* the time immediately around the menopause, often accompanied by longer cycles and heavier and prolonged bleeding. These menstrual irregularities are due to decline in ovarian follicular function, but no 12 consecutive months of amenorrhea (lack of menstruation) have yet occurred. This stage is often accompanied by hot flushes. The average age of peri-menopause is 45.1 years but it can start any time between ages 39 and 51, and can last between two and eight years (the average being five), 3- *Post-menopause:* a period of time where no menstruation has occurred in 12 consecutive months. The median age for this to happen is 51 years.

When a woman is post-menopausal, she has some additional long-term age-related health considerations such as the development of osteoporosis and cardiovascular disease. As a woman reaches the menopause stages of life, it is a good opportunity to assess overall health and lifestyle choices to address potential long-term health issues. The issue of menopause and post-menopausal health in women is of significance to society in general because of the universality of menopause, it affects all women and because of the unprecedented increase in the number of post-menopausal women [3].

Premature menopause is defined as occurring when a woman is less than two standard deviations below the median age for menopause in the referred population. Age of 40 yrs is often used as an arbitrary age below which the menopause is viewed as premature. There are primary and secondary premature ovarian failure [4].

The fall in hormones (estrogen and progesterone) levels at the post-menopause can cause a variety of symptoms such as hot flushes, night sweating, palpitation, headache, changes in the skin, brittle nails, hair loss, muscular aches, osteoporosis, Irregular menstrual periods, diminished sexual function, variable signs or symptoms which reflecting a depressed mood and oral discomfort [5−9]).

Oral discomfort is characterized by a burning sensation, sensation of oral dryness (xerostomia or dry mouth) and decreased saliva secretion (hypo-salivation or hypo-function) [10].

Xerostomia is a common oral concern for many patients. It is estimated that up to 10 percent of the general population experiences persistent oral dryness [11,12]. Xerostomia is more frequent with increasing age because the number of acini reduces and the amount of fatty and fibrous tissue increases, and over 25 percent of elders complain of daily dryness especially in post-menopausal women [13].

However, it does not necessarily relate to decreased salivary flow rate (hypo-function) in up to one third of cases. Although salivary gland failure may lead to OD, the subjective experience of xerostomia is not a reliable indicator of salivary gland hypo-function. it may also occur with the changes in the quality of saliva, while the amounts of saliva stay unchanged [14,15]. OD can lead to considerable difficulty in speaking, eating and tasting, and predispose mucosa to wounds, abrasion and infection [16−18].

Saliva can be considered a filtrate of the serum in as much as it is derived from the blood. It follows that the process of saliva production is linked to overall body fluid balance and that blood flow through salivary gland tissues (from branches of the maxillary and other arteries) has a major effect on the production of saliva. So, saliva is a good indicator of the plasma levels of various substances such as hormones and drugs and can therefore be used as a non-invasive method for monitoring plasma concentrations of medicines or other substances [19,20].

Total or whole saliva refers to the complex mixture of fluids from the salivary glands, the gingival fold (crevicular space), oral mucosa transudate, in addition to mucous of the nasal cavity and pharynx, non-adherent oral bacterial, food remainders, desquamated epithelial and blood cells, as well as traces of medications or chemical products [21].

So, the knowledge of normal salivary flow rate (SFR) is extremely important when treating dental patients. Early diagnosis and treatment of xerostomia and hypo-salivation will preserve the health of oral structures or tissues and lower the incidence of dental caries, fungal infections, and other oral diseases that could result from insufficient SFR. However, it receives little attention until its quantity diminishes or its quality becomes altered [22].

For 40 years, endocrinologists have used saliva as a supplementary sample matrix. Prior reviews, from Riad et al., (1982) [23] to lewis, (2006) [24], have focused on salivary analysis of many steroids, although numerous reported studies have demonstrated that saliva monitoring is a useful alternative method for analyzing hormones of other biochemical origins.

In addition, numerous publications have described the use of salivary hormone analysis in many fields of clinical and basic research to diagnose systemic illnesses, monitoring general health, and as an indicator of risk for diseases creating a close relation between oral and systemic health [25,26].

Salivary biomarkers such as salivary chromogranin A (CgA) and salivary cortisol are being explored as a